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NOVEMBER 4, 1986

- Searching for security
- The MIS drug abyss
- The next step in systems development
- Hello, voice packets
- Micros: Entry engines

COMPUTER DECISIONS
THE MAGAZINE FOR MIS EXECUTIVES
A HAYDEN PUBLICATION

ALTERNATIVES TO SIERRA

Can MIS find real alternatives to IBM in the plug-compatibles of Amdahl and NAS?

PAGE 32

Amdahl's John C. Lewis (left) and NAS' David N. Martin say they've got the products and strategies to challenge IBM. Users are beginning to decide if they're right.

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COMPUTER DECISIONS

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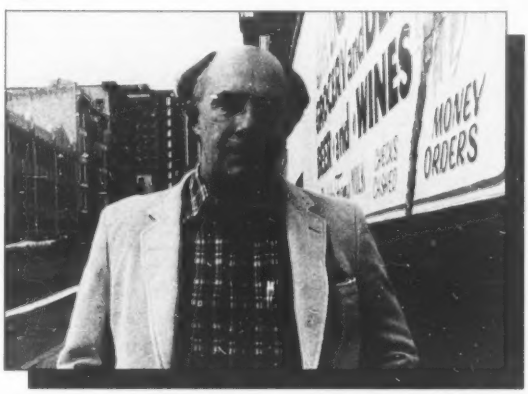

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Wang lap-top hard disk

Wang Laboratories Inc. (Lowell, MA) announced what it calls one of the fastest lap-top computers available. The IBM PC-compatible Wang Laptop costs $3,530 and features an 8-MHz 8086 processor, 512 Kbytes of RAM, a 10-Mbyte hard disk, a high-resolution liquid crystal display, a full-sized keyboard, and a built-in printer.

The new machine puts Wang in the same class as lap-top veterans Grid Systems Corp. (Mountain View, CA) and Toshiba America Inc. (Tustin, CA). Wang is one of only a vew vendors offering built-in hard disks on lap-tops, and is the only vendor offering a 2,400 bit-per-second modem as an option.

Wang also announced that the U.S. Postal Service and the Federal Home Loan Mortgage Corp., among others, have signed purchase agreements for large quantities of the lap-tops. □

ITT claims fast PC AT clone

ITT Information Systems, San Jose, CA, recently joined the ranks of vendors offering value-added clones of the IBM Personal Computer AT. The ITT Xtra/286 Advanced Technology Workstation includes a graphics card compatible with IBM's EGA and CGA and Hercules color adapter boards, a 10-MHz processor, and disk-caching software. ITT claims the faster processor and disk-caching software makes the ATW 30 percent faster than a standard 8-MHz PC AT.

The machine is available in two models. The Model I includes 640 Kbytes of RAM and a 1.2-Mbyte floppy drive, and costs $2,499. The Model II ($4,299) features a 30-Mbyte hard disk. For more information, call (408) 942-4000. □

Diskless workstations

With its new 3390 micro, NCR Corp. joined the growing number of vendors offering diskless workstations that provide local processing power at only slightly higher prices than many dumb terminals.

The Dayton, OH, vendor has already won over one major user with its diskless micro. New York-based financial services giant E.F. Hutton & Co. Inc. announced it plans to spend $20 million to replace 10,000 existing dumb terminals with NCR 3390s in 400 worldwide branches.

The diskless 3390 includes an Intel 80286 microprocessor running at 6 MHz or 10 MHz, 512 Kbytes of RAM, and serial and parallel ports, and costs from $1,694 to $1,894. With an optional 3½-inch 720-Kbyte floppy drive or 20-Mbyte hard disk, the price goes up to $2,789. All models include either IBM's CGA or EGA, or NCR's NGA video graphics adapters. □

IBM, Intel deal blow to clones

Clone makers may have a tougher time copying IBM Personal Computers because of a new agreement between IBM and chip maker Intel Corp. to develop customized chips jointly.

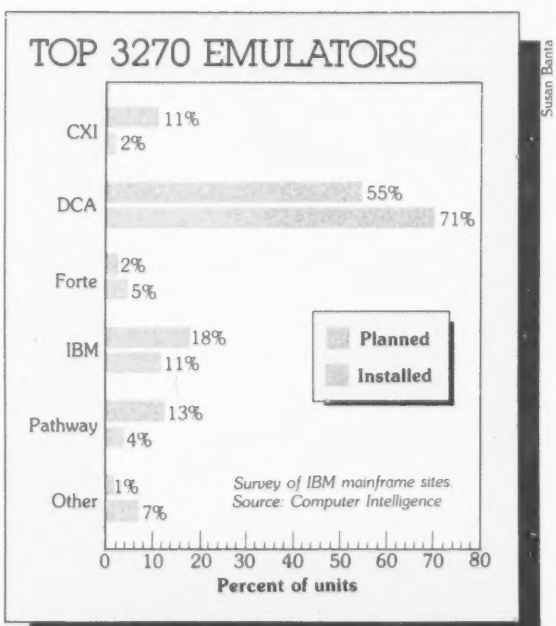
Under the agreement, Intel (Santa Clara, CA), of which IBM owns 13 percent, is receiving technology developed by IBM, including gate arrays, macrocell libraries, design software, and package technology. Intel will combine this technology with its popular chip offerings to produce customized hybrids, called application specific integration curcuits, for IBM.

Currently, IBM PCs and their imitators are based on the same Intel 8088 and 80286 microprocessors. Analysts speculate that the next generation of IBM micros will use proprietary chips. These chips will incorporate capabilites of current Intel chips to run MS-DOS applications but will have additional power and functionality. □

DCA buys connections

The recent acquisition of communications software vendor Microstuf Inc. by Digital Communications Associates Inc. means that DCA will be able to offer one-stop shopping to users looking to connect IBM Personal Computers to hosts.

"Whether it be asynchronous-to-asynchronous communications, or asynchronous-to-synchronous, DCA should now be able to offer users what they need," says Ilene Goldman, an analyst with International Data Corp., Framingham, MA. Microstuf (Roswell, GA), markets asynchronous communications software. DCA (Alpharetta, GA) sells network communications systems. □



Although Digital Communications Associates Inc. dominates the terminal-emulation board market, other vendors may be gaining ground, according to Computer Intelligence Corp. The market researcher reports that in a survey of IBM mainframe users, 55 percent said they plan to buy boards from DCA; the vendor currently controls 71 percent of the market.

standard IBM 3770 or 2770 communications lines." IBM did announce APPC/VM for seamless transfer of data between VM machines, but it uses a limited subset of LU 6.2. IBM openly hints at future peer-to-peer support for VM systems.

Offices already running Profs should greet the 937Xs with open arms. The Canadian branch of New York Life Insurance Co. (New York), for example, has a nationwide network of Profs users tied to two IBM 3083s in Vancouver. Project leader Chris Alley sees a potential role for a 937X as a Profs hub in the western part of Canada, where communication with a local procesor would reduce response time. But Alley wonders whether the smaller 370 machines could accommodate Profs' database manager. "If you have a large number of Profs users, you might need more storage and processing power than a smaller computer could provide," he says.

Several experts question whether the 937Xs offer have enough processing clout. Some wonder whether the 937X line, with its relatively old 370 architecture, can provide the power needed for highly interactive office applications. "The 370 architecture uses layer upon layer of software to provide interactivity and database capabilities," asserts David H. Andrews, president of Andrews, Duerr and Manteghian, a Cheshire, CT-based consultancy. "Much of the 937X's processing power will be chewed up running systems software. These software layers also require a lot of time and expertise to install and maintain."

IBM's Friedman counters that customers want full-fledged versions of 370 software on office machines, and says the 937Xs are powerful enough to handle them. He says a 9373 Model 20 running the Profs Text/Office module, Netview, and VM/IS including VTAM will run efficiently with the minimum 4 Mbytes of RAM.

Experts say the VM-based 937X line will be most popular for corporations that need remote processors for application development and office automation. At Bell South Services (Atlanta), MIS has discussed the possibility of installing 937Xs in some departments for those purposes. Bell South has VM mainframes in Atlanta and Birmingham for its programmers. The programmers use Profs for electronic mail and as a database facility for Displaywrite 370 documents, according to MIS director Michael Freeman. All nonprogrammers at Bell South currently use DEC VAXs; these other users, which include small groups of engineers, cannot access Profs or VM's development capabilities. With the 937X line, Bell South can now justify installing 370 machines for a relatively small number of users for engineering applications. For traditional office functions, however, Bell South is committed to All-in-One.

Although the 937X series is still too new for most users to have made firm plans for it, analysts agree that it will be a significant OA alternative for large corporations. "IBM has said that the 9370 series is for people who have an affinity for the 370 architecture," says Marty Gruhn, vice president of the Sierra Group, a market researcher in Tempe, AZ. "If you have any sense, this is what you'll buy if you're a large IBM user. The System/3X line is for non-IBM companies that don't have an established base of 370 software and expertise. As for DEC, when users' demand for software elegance overrides MIS demands for easy solutions, then it will still be a presence." —*Jennifer E. Beaver*

kets. MIS users concerned about the technical problems, and inelegance of connecting VAXs for commercial distributed processing are probably waiting for an IBM solution anyway, he notes.

Djurdjevic points out that the graduated one-time software prices for VM and VSE programs also bring IBM's pricing for distributed minicomputers in the same ballpark as DEC's. However, the graduated pricing scheme does not benefit users of IBM's largest machines. For example, the previous cost of licensing VM/SP HPO for three years was $62,900. The new one-time cost for VM/HPO can go as high as $101,700.

—*Joseph Braue*

DATA COMMUNICATIONS

PACKET USERS MAKE THE TELENET SWITCH

As a part of the merger that formed US Sprint Communications Inc., customers of the packet-switched services of Uninet Inc. are migrating to the more robust GTE Telenet Communications Corp. The transition, which was scheduled to have been completed this month, according to Floyd Trogdon, Telenet's vice president of network services, has created only minor problems for users.

However, Uninet users making the switch will be getting a new pricing schedule for their troubles. During the transition, about 30 Telenet and Uninet customers have been picked off by rival network Tymnet from McDonnell Douglas Network Systems Co., San Jose, CA. According to a corporate spokesperson, Tymnet is in part promoting the similarity between Tymnet and Uninet billing structures to woo potential customers.

Bill to suit. Before the merger, Uninet based its billing on kilocharacters, units of 1,000 characters; Telenet based its billing on kilopackets, 1,000 128-character packets. In July, Telenet started basing its billing on kilosegments, 1,000 64-character packets.

Some Uninet customers balked at making the transition to kilosegments immediately. "Many of the Uninet customers wanted to stay with the kilocharacter scheme because they were already comfortable with that method of charging," says Trogdon. "We've allowed them to stay with the old billing until July 1987. In some cases, at the customer's request, we've permitted them to do so for over two years."

Telenet Communications Corp.

Floyd Trogdon, vice president of network services at Telenet, says the merger between Uninet and Telenet has resulted in a more powerful network.

Nevertheless, those years fly by quickly. Tymnet knows this, and, according to a spokesperson, is putting the call out to customers who want to stay with

kilocharacter billing. "We get lists of Uninet customers, and take into account the fact that they will be disrupted by the switch," the spokesperson says. Mitch Stocks, vice president of telecommunications at Aviotex, Costa Mesa, CA, a nationwide provider of aviation weather and flight planning information, decided to switch from Uninet to Tymnet. "The nail that sealed the coffin was the pricing change," he says. "Telenet went from the Uninet kilocharacter pricing, which was attractive, to kilosegment pricing, which was unattractive."

Customers like Stocks use packet switching for interactive applications sending a small number of characters at a time. Under Telenet's new billing scheme, they would be charged for a kilosegment for every transmission, even if a full kilosegment isn't used. With Tymnet's kilocharacter pricing, Stocks' charges are much less than they would be on a kilosegment basis, he says.

However, according to John Vernagus, Telenet's director of marketing programs, users must be aware that prices for any network will vary according to a particular application. For example, in a credit card authorization scheme, a user would not typically fill up a kilosegment, because he or she is simply sending bursts of data from a remote character reader with a credit card and receiving an authorization code back. For such applications, Vernagus says, Telenet offers a special option called transaction pricing. "Kilosegment pricing is for more data-intensive applications," Vernagus says. "It allows users to take advantage of terminal intelligence and fill up the network envelope. Users get the best of both worlds."

Tymnet counters that under kilocharacter pricing, a customer is only charged for the characters being sent over the network and is not charged for such extras as carriage returns and addressing the computer. "As soon as you hit the Tymnet interface, all overhead is stripped away and at that point the accounting takes place," says a Tymnet spokesperson. "In a segment, you are charged for a 64-character packet. A kilosegment is a nebulous figure because a user can't tell what quantity of that segment is being filled and what amount is network overhead."

Loyal followers. Many Uninet customers decided to move to Telenet despite the billing changes. Ron Reitz, VAX technical support specialist at Johnson Controls, a diversified manufacturer in Milwaukee, extended his Uninet-type billing for three years. According to Reitz, after three years, Johnson Controls will be in a position to switch suppliers, switch to Telenet's new pricing structure, or renegotiate its contract. Dawn Scott, operations manager at the Milwaukee-based Admiral division of the Maytag Co., the Newton, IA-based appliance manufacturer, says the manufacturer will remain under the Uninet billing for a full year.

Mitch Stocks was also offered a long-term contract. "Our district salesman from Uninet said that we could lock in Uninet pricing by signing in an extended term agreement for three years," he says. "When the offer was finally made, it was really only an extension for about 18 months. Futhermore, we would have had to commit to a minimum of 75 percent of our average monthly billing."

Many of those customers who remained within the fold and made the transition are satisfied. Dawn Scott has approximately 60 employees throughout the United States using Telenet for order entry and inquiry. "We've had a few problems," she says. "We had to change the address on our computer. The other problem was in the software. When we were first bringing up Uninet, we had to use an approach to the protocol X.25 that Telenet was supposed to know about. It didn't. When we came up on Telenet, the network didn't work. We figured out why in 10 minutes. We went back to Uninet until Telenet upgraded its software. By the next day we switched to Telenet again."

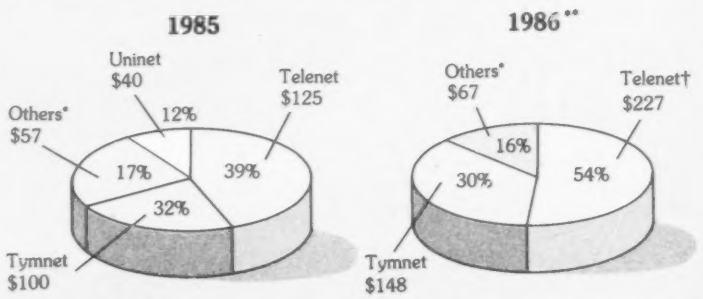
The National Center for Atmospheric Research, a Boulder, CO-based research and development laboratory, also made the transition to Telenet. However, Joseph Choy, group head of networking and data communications, was approached by Tymnet and is evaluating its service. With about 800 users, Choy says his staff did considerable preparatory work with Telenet to make sure the parameters set for the Uninet network were adjusted for Telenet. Despite the advance work, Choy had problems with packet assembler-disassemblers. "Telenet and Uninet PADs don't overlap completely," he says. "Uninet has a PAD in Ames, IA; Telenet does not. Telenet was supposed to install a PAD for us. Because of a mix up, it still hasn't." Nevertheless, Choy is pleased with the transition. The users that came through the Ames PAD temporarily use toll-free numbers. "Telenet charges us for a regular low-density connect," he says. "They wouldn't charge us for the 800 numbers."

Such problems are typical, according to Trogdon. "Every arrangement with a customer has nuances that we haven't anticipated," he says. "We've been able to resolve every one of them. We keep the customer running parallel with Uninet until we are absolutely certain that all the bugs are out."

No answer. However, Stocks cites a lack of support from both Uninet network control personnel and his customer service location in Kansas as the impetus for the switch from Uninet to Tymnet. He says his dissatisfaction began before the merger. "I've called our local support service and there were times that I couldn't find our systems engineer or anyone in our local office. This worsened as the merger came closer because Uninet wasn't interested in expanding the staff."

From a technical perspective, Uninet's remote-call forwarding gave him problems as well, he says. "We had some customers in Colorado that were dialing into an access node in, say, Denver," says Stocks. "Suddenly there was a problem with it. They called us and we began to trouble-

TELENET EXTENDS VAN LEAD



Others include IBM Information Network, GEISCO, Boeing Computer Services, ADP, and AT&T.
***Projected market shares for 1986.*
†After merger of US Sprint and GTE Telenet. Revenues in millions of dollars
Source: Newton-Evans Research Co.

shoot the problem. We discovered that not only was that particular access node out of order, but so were all the other nodes in the state." By talking to staff at the network control center, he discovered that the calls in Colorado, no matter where they originated, were being remote-call forwarded into the PAD center. "If access into the PAD location disappeared for whatever reason—in this case it was a phone line problem—the whole state of Colorado was out of the order," says Stocks. He believes these "single points of failures" occur because Uninet put together its network too quickly. "It was easy to establish a national presence by virtue of the call forwarding trick," he says.

Although Stocks' difficulties were enough to send him to Tymnet, Admiral's Scott, is pleased with Telenet. Telenet and Uninet require different access procedures, but there was no training required, she says. "We reprogrammed our crts for another dialing number and another sequence to get into the network. Our users only punch one key." Choy passed out crib sheets to his users, who are generally adept with computers, to help them with the online documentation procedures.

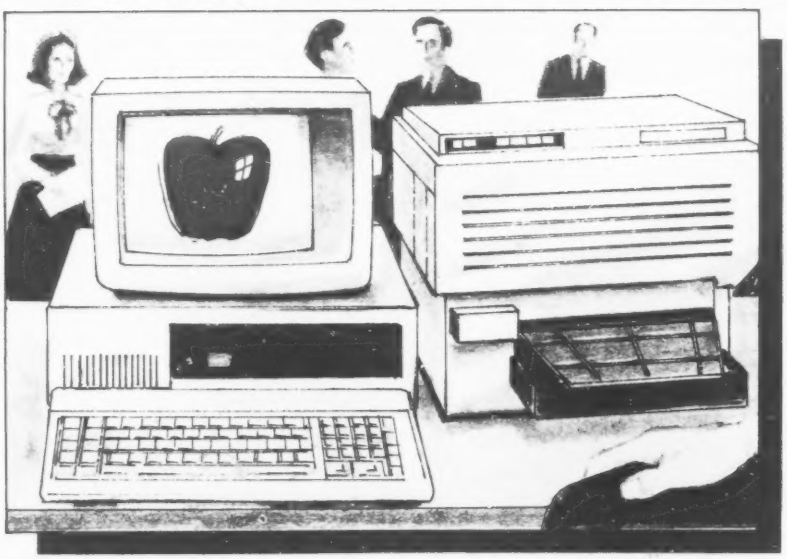
A Tymnet spokesperson says the corporation reaches 109 more cities than does the combined Uninet and Telenet network, a factor that influenced Stocks. "Our decision was based on access locations because we are making plans to go international," he says. In addition, a Tymnet spokeperson says, the Tymnet network is in place and will not undergo any changes. "The merger between Uninet and Telenet could potentially have a period of adjustment, where users may not see the level of service that they are accustomed to," he says.

Floyd Trogdon counters that customers are getting better network coverage, and a more powerful network. "The new integrated network has more advanced technology than Uninet had previously," he says. "It's based on the Telenet technology, but has progressed a little further. Telenet now offers a broad range of protocols and protocol conversion that were not available on the Uninet network."

—Robert Moran

CORPORATE MICROS

IBM GETS DESK-TOP PRINTING LIFT



As the first round of desk-top publishing software for the IBM Personal Computer makes its debut, corporate users are wondering whether the PC can deliver the same functionality as the Apple Macintosh, the graphics-oriented darling of the desk-top publishing world.

For graphics-oriented tasks, such as brochures and newsletters, the Mac from Apple Computer Inc., Cupertino, CA, still reigns supreme. But for those applications in which text is the prime element the IBM PC offers capabilities that may equal or surpass those provided by the Mac.

Some analysts believe that the distinctions between the two micros may be short-lived, however. "The IBM PC will become increasingly like the Mac," predicts Jerry Kocimski, an analyst with Dataquest Inc., San Jose, CA, market researchers. Jonathan Seybold, a publishing consultant in Malibu, CA, believes that IBM will either develop or purchase equipment to make the PC more like the Mac. "IBM has said that desk-top publishing is the application that is driving where microcomputing is going," says Seybold. "IBM is incorporating increased use of graphics, more facile input devices, and increased memory," he says. IBM recently set up a publishing system business unit in Boulder, CO, to put together IBM solutions for clients' publishing needs across the spectrum.

Getting in gear. Much of the new desk-top publishing software for the IBM PC requires the PC to be outfitted with additional hardware that increases its graphics capabilities, including graphics cards and extra memory for graphics processing. A high-resolution monitor is another possible addition, although it is not usually required. Without these additions, according to publishing consultant Bill Dorman of Marshfield, MA, an IBM PC cannot be used as a Wysiwyg (What-you-see-is-what-you-get) device, which means that the user cannot view the page or document until it is printed. Both the Ventura Publishing Edition from Xerox Corp., Stamford, CT, and the IBM PC version of Pagemaker from Aldus Corp., Seattle, have these hardware requirements.

Even with these additions, however, the PC will not work like a Mac. The Mac processes everything, including text, as if it were graphics and has a closed architecture that lends consistency to internal processing. "By putting in these new components, designed by different manufacturers, you are adding additional levels of translation to the PC," explained Dataquest's Kocimski. "The process will be slow, and, if the components don't work well together, frustrating. With the IBM PC, you can spend a lot of money and still be dissatisfied. If you want sophisticated input, it's quite possible you will find that the hardware will not perform to the level of the software, and the software will not perform to the level of the application—so you can struggle, wait, or switch to the Mac."

Aldus is addressing the problem of incompatible hardware upgrades by working with other manufacturers to develop a suite of recommended devices, such as

(Continued on page 30)

FOLLOWING THE LEADERS

MAINFRAMES: A BUYER'S MARKET

With IBM price cuts and alternative mainframes from Amdahl and NAS, MIS executives may now have an advantage in large-system purchases.

by Lee Keough, Industry Editor

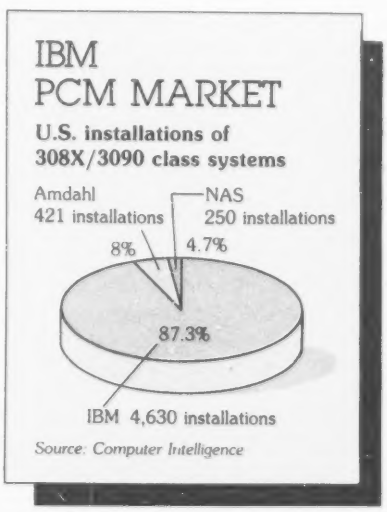
MIS managers seeking alternatives to IBM large systems enjoy an advantage they haven't had in years. Early reports from mainframe customers of Amdahl Corp. and National Advanced Systems Inc., the two vendors offering plug-compatible alternatives to IBM mainframes, are generally positive. And with IBM facing a financial squeeze, it has been unusually swift in dropping prices and increasing the performance of its top-of-the-line 3090 series to keep its customers in the fold.

Despite the possibility that IBM may become even more aggressive to protect its turf, most observers believe both Amdahl (Sunnyvale, CA) and NAS (Mountain View, CA) are sitting pretty. They are just starting to ship their versions of IBM's 3090 series and have years to reap the benefits before a new product cycle begins. Additionally, the cycle for disk drives currently coincides with the cycle for mainframes. NAS and Amdahl remarket Japanese versions of IBM's 3380 disk drives and expect to gain big profits reselling this equipment. Add to this the belief of some observers that users, having become more sophisticated, are demonstrating a greater willingness to buy plug-compatible mainframes, and things look very good for the two vendors.

Yet not all reports are glowing. The Hitachi uniprocessor marketed by NAS, the AS/XL 60, has been criticized as performing below the level of the IBM 3090 Model 200 in some applications. NAS claims the AS/XL 60, which began shipping in May, is the functional equivalent of the 3090/200. IBM-watcher Bob Djurdjevic of Phoenix-based Annex Research Inc. rates the AS/XL 60 between 23 million instructions per second and 25 MIPS, slightly below the generally accepted range of 27 MIPS to 29 MIPS for IBM's machine.

NAS officials deny that its processor is performing below expectations. One of its first customers gives the NAS mainframe high marks. Thomas Blodgett, senior vice president of information systems and services at Miami-based Southeast Bank N.A., says early benchmarks for the AS/XL 60 place its performance at 28 MIPS. Blodgett is running all the bank's batch and online production work on the AS/XL 60 under MVS/XA. The online applications, which operate under MVS/XA with CICS, have performed particularly well, he notes. "We see a significant difference in online applications, in terms of response time and cycle time, because of the uniprocessor," says Blodgett. "It's a super online machine." Users pay a performance penalty when running online applications on dual processors, say NAS officials.

Users and vendors have complained for years that a MIPS rating does not necessarily portray processing performance accurately because each mainframe design interacts with various applications in different ways. Some question has also surfaced regarding whether MIPS ratings for Japanese processors are equivalent to MIPS ratings for American-made mainframes.



Morgan Stanley & Co., a New York investment house, contracted to buy an AS/XL 60 from NAS shortly after it was announced and had planned to run a number of applications written in A Programming Language (APL) on the machine. After benchmarking the workload on an AS/XL 60, Morgan Stanley was not satisfied with its performance, and canceled the contract. But later this year, Morgan Stanley placed a new order for an AS/XL 60. After benchmarking some of its online applications on other NAS processors, Morgan Stanley found that the AS/XL 60 offered the best performance.

"In some applications we outperform IBM and in some cases we underperform IBM," says Mitch Schoch, director of systems marketing for NAS. NAS officials concede the AS/XL 60 does not perform batch applications as well as the 3090/200, but claim the reverse is true when running interactive applications. If a processor performs significantly below expectations in a benchmark test, Schoch says NAS considers renegotiating the price.

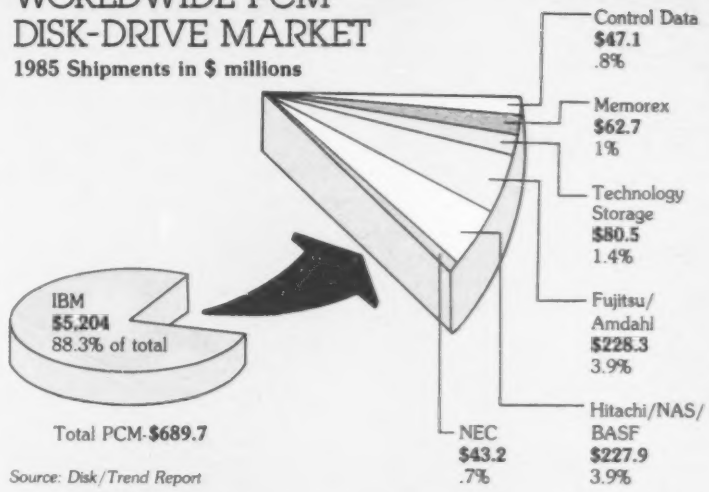
John C. Lewis, Amdahl's chief executive officer, says Japanese mainframes are optimized for scientific computing. When running commercial workloads on a Japanese-manufactured processor, Lewis claims users will not achieve the same performance levels that they would with a scientific workload. Lewis says Amdahl avoids this problem by designing its own mainframe and building it with Fujitsu parts.

Amdahl's new processor, the 5890/300 is getting an enthusiastic reception. Amdahl says the processor performs about 10 percent above its originally announced levels. "We expected performance levels of about 38 MIPS when we contracted for the machine," says Ronald L. Woodall, executive vice president of information systems for Chilton Corp., Dallas. "But we've exceeded that by 9 or 10 percent." Chilton, a consumer credit reporting service and a subsidiary of Borg-Warner Corp., Chicago, runs its network on the 5890/300 under MVS/XA. Woodall says the mainframe has performed flawlessly since being installed at the end of July, and is providing subsecond response time for online applications.

Online applications are a good choice for the 5890/300, according to David Karney, vice president of MIS for Dallas-based Southland Corp., the $12 billion parent of 7-Eleven and Chief Auto Parts retail stores. Southland, which installed the first 5890 last June, also has an IBM 3090/200 in its shop. Karney says he chose to run batch and test applications on the 3090 and online applications under

WORLDWIDE PCM DISK-DRIVE MARKET

1985 Shipments in $ millions



Source: Disk/Trend Report

Vincent J. Gallo

CICS on the 5890/300. "The 5890 has a faster processor," he says.

Norman Laefer, a staff analyst at Chicago-based Amoco Corp. and the president of Amdahl's user group, says that although it is too early to judge, users appear to be very pleased with the 5890, especially because it is performing above original expectations.

Djurdjevic says that of the two plug-compatible vendors, Amdahl has the perceived advantage in processors, particularly since it provides features that differentiate its mainframes from IBM's. The best example of Amdahl's effort is the Multiple Domain Feature of its 580 and 5890 processors. MDF allows users to dynamically divide a single processor and allocate resources to two different operating systems. For example, a user could allocate the resources in a 5890/300 to up to four different operating systems without the substantial overhead burden that IBM's VM operating system requires to achieve the same split. Woodall is using MDF to carve out a portion of the 5890/300's processing capability for use in development work. "MDF lives up to its hype," he says.

Amdahl's processors may have more features than its competitors, but NAS and IBM offer bigger disk drives. NAS has been selling Hitachi's version of IBM's popular 3380 5-gigabyte double-capacity drives since April. Amdahl sells a 2.5-Gbyte Fujitsu drive, and will start shipping a double-capacity drive this fall. Unlike IBM's 3380, which uses thin-film heads, the Hitachi and Fujitsu drives use ferrite heads, an older technology.

"Thin-film heads weren't necessary for the 3380," says James Porter, editor of *Disk Trend Report*, Los Altos, CA. "There is no functional advantage to them, so the Japanese took the more conservative approach." That was a good decision for Hitachi, says Porter, since Hitachi brought out its drives early enough to capitalize on rising market demand for 3380s. The Japanese-made disk drives sold by NAS and Amdahl cost about 20 percent less than the IBM 3380.

Of the single capacity 3380-type drives, NAS' drive has been the most reliable, says Larry Martin of Reliability Research, Norwalk, CT. IBM's 3380 was second in the reliability ratings for the past six months, he says, with Amdahl's drive third. After correcting technical problems, says Martin, Amdahl's drive has dramatically improved its performance; data for one month show Amdahl outperforming IBM. But, cautions Martin, one month is not long enough to be conclusive. "At this point," says Martin, "it would seem Hitachi [NAS] is clearly the IBM competition."

In both storage and processors, the plug-compatible vendors offer significant advantages. Plug-compatible boxes are smaller and cheaper to power. They also cost about 20 percent less. The question is whether the plug-compatible vendors can withstand IBM's aggressive pricing and still turn a profit.

Thomas Henkel, a consultant with the Boston-based Yankee Group, says users should expect normal price reductions of about 10 percent annually, but IBM will combine these cuts with added features for the 3090 that will increase performance. "NAS and Amdahl will have more to sell against, if that happens," says Henkel, explaining that it will increase the pool of potential customers. Henkel believes the plug-compatible vendors may also provide similar performance increases. "They can keep up with this generation of IBM mainframes." □

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HOW THE PCMs STACK UP

Vendor/ Product	MIPS	Price per MIPS	Memory (Mbytes)	Channels	Price*	Offered
Amdahl 5890						
200	27-29.7	$127,946-$141,666	64-256	32-64	$3.8	1Q87
300	36-39.6	$113,636-$125,000	64-256	32-64	$4.5	Now
600	58-63.8	$133,226-$146,551	128-512	64-128	$8.5	4Q87
NAS AS/XL						
50	15.5-20	$152,500-$196,774	32-256	16-48	$3.1	1Q87
60	23.3-29	$145,793-$183,826	64-256	24-64	$4.2	Now
80	42-50	$142,000-$169,047	64-256	24-64	$7.1	Now
90	58-70	$139,971-$168,350	128-512	48-98	$9.8	3Q87
100	73-98	$125,963-$169,209	128-512	48-98	$12.4	3Q87
IBM						
150	9.6	$177,083	32-64	16-24	$1.7	Now
180	15	$173,333	32-64	16-32	$2.6	Now
200	27.1	$166,051	64-192	32-48	$4.5	Now
400	47.3	$179,704	128-640	64-96	$8.5	Now

**In millions*

Statistics supplied by vendors and Annex Research.